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~~Description~~

Security device

FIELD AND BACKGROUND OF THE INVENTION

The invention relates to a device for actuating  
10 a security device, preferably for securing a motor  
vehicle against unauthorized use, in which a control  
unit has means for transmitting a first coded  
electromagnetic signal (stimulus signal), in which a  
portable transmitter (radio key) has means for  
15 receiving the stimulus signal and for transmitting a  
second coded signal (enable signal), and in which the  
control unit is connected to the security device and  
actuates the latter if the enable signal is received  
and recognized.

20 Such radio keys are used today for unlocking  
the doors of motor vehicles without contact, for  
example. They are known from WO 92/18732, for example.

If the steady-state transmission and reception  
frequencies for such conventional systems are known,  
25 relatively simple transceivers can also forward the  
stimulus signal over relatively long distances from the  
vehicle to the authorized user and hence stimulate a  
key. If appropriate transmitters and receivers are also  
used for transmitting back the response signal, the  
30 response signal can also be traced back to the vehicle  
and used for unauthorized access to the vehicle.

*provide*  
a *specify* The object of the present invention is to  
provide a device for conveniently and contactlessly  
actuating security devices, in particular the central  
35 locking system and immobilizer in motor vehicles, which  
makes such unauthorized access virtually impossible.

*Wherein*  
The invention achieves this object ~~by virtue of~~  
the ~~feature that~~ both the control unit and the radio  
key have means for altering the carrier frequency of

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As a basis for generating the separate carrier frequencies for this frequency hopping, the same cryptoalgorithm can be used as for normal message authentication. In this context, the authentication component of the enable signal is at the same time the basis for selection of the discrete carrier frequencies. This has the advantage that no additional computation time need be taken up for generating this data.

In a further refinement of the invention, the signal transmission takes place over a spectrum of different carrier frequencies and the enable signal contains a coded information item for modulating this spectrum. The use of this spread spectrum transmission likewise makes signal transmission very secure.

In this context, the authentication component (for example) of the enable signal can be used as a basis for producing the spread spectrum modulation sequence. In this case, all advantages in terms of computation time taken up etc. are retained. The fact that the present and further spectral distribution of the transmitted signal is known at the transmission and reception ends means that, additionally, the otherwise necessary synchronization or locking on between the transmitter and the receiver is eliminated in the spread spectrum method.

*BRIEF DESCRIPTION OF THE DRAWING*

Illustrative embodiments of the invention are shown in the drawing with the aid of a plurality of figures and are explained in more detail in the description below. In the figures:

Figure 1 shows a schematic diagram for deriving transmission channels from a stimulus signal and

Figure 2 shows graphs of the resultant transmission spectra.

In the figures, identical parts are provided with identical reference symbols.

*DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT*

Figure 1 shows how a radio key uses the stimulus signal 1 (challenge signal) transmitted by the

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Figure 2 shows the resultant transmission spectra (A=amplitude) for the radio key when its enable signal is transmitted. Whenever a particular time t or a particular number of data bits has passed, there is a changeover to another channel on the basis of the previously determined sequence. The control unit likewise changes over its reception device synchronously, so that rapid data transmission is assured.